



Docket 6013-02CPA

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Carl R. Lehfeldt, Chris Waters, Charles Glorioso

Parent U.S. Serial No: 09/ 261,084

Group Art Unit: 2632

Parents Filed: 02 March 1999

Examiner: Nina C. Tong

15 October 2002

19 February 2003

Title: "TAMPER DETECTION MECHANISM"

Clean Version Of Claims

sub. H1

1. A system for detecting unauthorized movement of a communications/meter device, the system comprising:
at least one device attachment mechanism, having a selected attachment direction, that attaches a communications/meter device to a selected attachment site;
a magnetic field source, associated with the attachment mechanism, that provides a first magnetic field within a first field direction and a second magnetic field with a second magnetic field direction when the attachment mechanism is in a first selected position and in a second selected position, respectively;

cont.

a field-activated magnetic switch, positioned adjacent to the attachment mechanism and arranged so that, when the first magnetic field is applied to the switch, the switch is in a first switch state, and when the second magnetic field is applied to the switch, the switch is in a second switch state, distinct from the first switch state;

an electrical current source, connected to the field-activated magnetic switch at a first selected location, that provides a current through said switch;

an electrical current sensor, connected to the field-activated magnetic switch at a second selected location, that senses a level of current through the switch; and

a switch sensor, connected to and sensing the state of the switch, that generates a selected alarm signal when the switch is not in the first switch state.

2. The system of claim 1, further comprising a signal transmitter, associated with said communications device, that transmits a selected signal when said field-activated magnetic switch is not in said first switch state.

3. The system of claim 1, wherein said second position of said attachment mechanism is selected from the group of positions consisting of: (i) rotation of said attachment mechanism about said attachment direction by at least a selected threshold angle, and (ii) translation of said attachment mechanism in said attachment direction by at least a threshold distance.

4. The system of claim 1, wherein said attachment mechanism at said first position provides a magnetic field projected in a selected sensing direction, with a

projected field magnitude that is at least equal to a selected magnetic field magnitude threshold.

5. The system of claim 1, wherein said attachment mechanism at said first position provides a magnetic field projected in said selected sensing direction, with a projected field magnitude that is less than said selected magnitude threshold.

7. The system of claim 1, wherein said magnetic field source is a permanent magnet having a selected magnetic field direction and including a magnetic field drawn from the group of materials consisting of aluminum-nickel-cobalt, iron-cobalt, iron-samarium, permalloy and Mn-Zn ferrite.

8. The system of claim 1, wherein said magnetic field source is a permanent magnet having a selected direction that is oriented at a selected orientation angle relative to a selected switch direction associated with said switch, when said switch is in said first switch state.

9. The system of claim 1, wherein said field-activated magnetic switch is drawn from a group of switches consisting of a reed switch and a Hall effect switch.

10. The system of claim 1, wherein said field-activated switch has an activation direction for change of state of said switch, and at least one of said first magnetic field direction and said second magnetic field direction is chosen to be

approximately perpendicular to a plane defined by said attachment direction and the switch activation direction.

11. The system of claim 1, wherein said attachment mechanism is drawn from a group consisting of a bolt, a screw and a friction-generating nail, and said attachment direction is chosen to be approximately a longitudinal direction of a shaft of the bolt, the screw or the nail.

12. A method for detecting unauthorized movement of a communications/meter device, the method comprising the steps of:

providing at least one device attachment mechanism, having a selected attachment direction, that attaches a communications/meter device to a selected attachment site;

providing a magnetic field source, associated with the attachment mechanism, that provides a first magnetic field within a first field direction and a second magnetic field with a second magnetic field direction when the attachment mechanism is in a first selected position and in a second selected position, respectively;

positioning a field-activated magnetic switch, positioned adjacent to the attachment mechanism and arranged so that, when the first magnetic field is applied to the switch, the switch is in a first switch state, and when the second magnetic field is applied to the switch, the switch is in a second switch state, distinct from the first switch state;

providing a switch sensor, connected to the magnetic switch, to sense the switch state of the switch;

providing an electrical current source, connected to the field-activated magnetic switch at a first selected location, that provides a current through said switch;

providing an electrical current sensor, connected to the field-activated magnetic switch at a second selected location, that senses a level of current through the switch; and

generating a selected alarm signal when the switch when the switch is not in the first switch state.

13. The method of claim 12, further comprising the step of transmitting an alarm signal when said field-activated magnetic switch is not in said first switch state.

*8/1
Cont.*

14. The method of claim 12, further comprising the step of selecting said second position of said attachment mechanism from the group of positions consisting of: (i) rotation of said attachment mechanism about said attachment direction by at least a selected threshold angle, and (ii) translation of said attachment mechanism in said attachment direction by at least a threshold distance.

15. The method of claim 12, further comprising the step of selecting said magnetic field source to provide, at said field-activated magnetic switch, a magnetic field with a projected field magnitude that is at least equal to a selected

magnitude threshold.

16. The method of claim 12, further comprising the step of selecting said attachment mechanism at said first position provides a magnetic field projected in a selected sensing direction, with a projected field magnitude that is less than a selected magnetic field magnitude threshold.

18. The method of claim 12, further comprising the step of selecting said magnetic field source to be a permanent magnet having a selected magnetic field direction and including a magnetic field drawn from the group of materials consisting of aluminum-nickel-cobalt, iron-cobalt, iron-samarium, permalloy and Mn-Zn ferrite.

11
Cont.
19. The method of claim 12, further comprising the step of selecting said magnetic field source to be a permanent magnet having a selected direction that is oriented at a selected orientation angle relative to a selected switch direction associated with said switch, when said switch is in said first state.

21. The method of claim 12, wherein said field-activated switch has an activation direction for change of state of said switch, further comprising the step of choosing at least one of said first magnetic field direction and said second magnetic field direction to be approximately perpendicular to a plane defined by said attachment direction and the switch activation direction.

*11
Carld*

22. The method of claim 12, further comprising the step of selecting said attachment mechanism from a group consisting of a bolt, a screw and a friction-generating nail, and choosing said attachment direction to be approximately a longitudinal direction of a shaft of the bolt, the screw or the nail.

N.E.

33. A system for detecting an unauthorized movement of a communications/meter device, the system comprising:

at least one device attachment mechanism, having a selected attachment direction, that attaches a communications/meter device to a selected attachment site, the attachment mechanism having a first sector and a second sector that are electrically conducting and non-conducting, respectively;

an electrical circuit, including at least one of a source of current and a source of voltage, that is electrically connected to the attachment mechanism at two spaced apart terminals, where the two terminals are both connected to the conducting sector when the attachment mechanism is in a selected first position, and at least one of the two terminals is connected to the non-conducting sector, when the attachment mechanism is in a second selected position; and

a sensor of at least one of current and voltage, connected to the circuit, that generates an alarm signal when at least one of the following conditions occurs: (1) the sensed current is in a first selected range and (2) the sensed voltage is in a selected second range.

*112 sub 11
1 Oct.*

43. The system of claim 1, wherein said electrical current sensor senses at least one of a first level of said current, when said switch is in said first switch

state, and a second level of said current, when said magnetic switch is in said second switch state.

8/2
Canld

44. The method of claim 12, further comprising sensing at least one of a first level of said current, when said magnetic switch is in said first switch state, and a second level of said current, when said magnetic switch in in said second switch state.